PRE-OPERATIONAL REQUIREMENTS FOR TA-53 EMISSIONS MONITORING EQUIPMENT

Purpose

This Meteorology and Air Quality Group (MAQ) procedure describes the steps required to ensure the emissions monitoring equipment at TA-53 exhaust stacks are ready for the facility to begin operations.

Scope

This procedure applies to the air monitoring equipment used for emissions measurements at the TA-53 monitored exhaust stacks. Also included are systems used for diffuse emissions measurements from TA-53 buildings.

In this procedure

This procedure addresses the following major topics:

Signatures

Prepared by: Kevin Anderson, MAQ	Date: 02/23/06
Approved by: David P Fuehne David Fuehne, Rad-NESHAP Project Leader	Date: 02/23/06
Approved by: Digitally signed by Terrance L Morgan serialNumber=082197 + cn=Terrance L Morgan, ou=People, ou=Los Alamos National Laboratory, ou=Department of Energy, o=U.S. Government, c=US Date: 2006.02.27 09:42:46 -07'00' Reason: I am approving this document Location: White Rock Terry Morgan, QA Officer	Date: 02/23/06
Work authorized by: Dianne Wilburn, Acting MAQ Group Leader	Date: 02/23/06

02/24/06

General information about this procedure

Attachments

This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Hazard Review	2
2	Pre-Operational Checklists for ES-2 and ES-3	2
3	LANSCE Stack Monitoring Instrumentation	2
4	Sample of Posting Label for Instrument Panel	1

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	7/26/1993	New document, issued as MP-7-OP-9-1.01, "Procedure for Calibration of LAMPF Stack Flow Rate and Pressure Monitoring Equipment"
1	6/1/1998	Reformatted under LANSCE-FM document control. Contents revised and expanded to reflect current operations and to cover all pre-operational requirements. Issued as 53FMP-104-10.1
2	2/4/02	Reformatted under ESH-17 document control and work authorization, revised to add chapter *Pre-Operational Emissions Projection*.
3	03/01/06	Removed tritium monitoring requirements, removed procedural requirement for ceased Area A activities, changed calibration requirements for instruments, changed stack flow measurement requirements, changed sample system leak checks, and changed ES-3 Stack monitoring requirements (memo: ENV-MAQ 06-049).

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- Personnel assigned to the LANSCE stack monitoring effort

Training method

The training method for this procedure is **mentored** training by a previously trained employee and is documented in accordance with the procedure for training (MAQ-024).

General information, continued

Prerequisites

In addition to training to this procedure, the following training is also required prior to performing this procedure:

- TA-53 Site Specific training (required for unescorted TA-53 access)
- TA-53 Limited Access Area training for certain experimental areas
- Radiological worker training as appropriate for different areas

Definitions specific to this procedure

LANL Standards and Calibration Laboratory (S&C Lab): Group ESA-MT (Measurement Technology) maintains the Laboratory's standards and calibration facility, which uses NIST-traceable systems & techniques to verify calibration of electronic and physical measurement devices.

References

The following documents are referenced in this procedure:

- MAQ-024, "Personnel Training"
- MAQ-601, "Collecting and Processing Stack Air Particulate and Vapor Samples from TA-53"
- MAQ-603, "Calibrating the High Purity Ge System Used on the Monitored Stacks at TA-53"
- MAQ-604, "Performance Testing of the Kanne Air Flow-Through Ion Chambers"

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Introduction

Monitored stacks

The monitored stacks at the Los Alamos Neutron Science Center (LANSCE), located at LANL Technical Area 53, are designated TA-53-BLDG-7-ES-2 and TA-53-BLDG-3-ES-3. For simplicity, the stacks are referred to in this procedure as ES-2 and ES-3, respectively.

Required calibrations

To ensure accurate measurement and sampling of radioactive air emissions from the LANSCE stacks, all air monitoring equipment must be in proper working order. Certain devices measuring air flow rate or pressure have been identified as requiring calibration at set frequencies. A list of these instruments and their calibration frequencies appears in Attachment 3. Emissions staff can add instruments to the list or remove them as needed, to support LANSCE operations.

Critical units are checked for calibration prior to delivery of beam to the beam switchyard or any experimental area. If an instrument's calibration time limit will expire prior to the end of the beam operating period, it must be exchanged for a calibrated instrument prior to this time limit expiration. To minimize the affect on facility operations, the unit should be exchanged during a facility-scheduled maintenance outage.

Other devices are calibrated or performance tested by LANSCE Emissions staff or other appropriate individuals prior to each LANSCE operating cycle and as needed during the cycle. These devices are identified throughout the procedure.

Who performs calibrations & performance tests

The LANL Standards and Calibration Laboratory calibrates:

- all equipment listed on Attachment 3.

The MAQ emissions staff calibrates:

- gamma detection systems
- Kanne flow-through ionization chamber electronics.

Introduction, continued

Contamination concerns

Internal contamination may exist on the ventilation and sampling systems. Components which are part of the sampling lines should be checked by HSR-1 for contamination prior to sending them for calibration. Instruments sent for calibration must be properly tagged by health physics.

Prior to inspecting or testing any components which are part of the ventilation system or sampling systems, discuss potential contamination concerns with health physics personnel. In all cases, when accessing internal components of ventilation systems, gloves should be worn and other protective clothing as advised by HSR-1. Consult with health physics prior to opening any sample lines or ventilation systems; a radiological work permit (RWP) may be required before performing portions of this procedure.

Checklists

To simplify verification that pre-operational requirements have been met, a checklist for each stack appears in Attachment 2. The checklist may be used by staff. Alternatively, most routine items on the checklist are also included in the "Equipment Readiness Checks" documentation, maintained by LANSCE-6.

Flow Measurement Instrumentation

Background

To measure flow through the various sampling systems (gas and particulate), a calibrated orifice is used in conjunction with an instrumentation panel. This panel contains a pressure gauge, which monitors pressure drop across the calibrated orifice, and a transducer which converts the pressure drop to an electronic voltage signal, allowing for remote monitoring of the flow. The pressure drop across the orifice is proportional to the flow through the orifice, and therefore proportional to the flow through the sampling system.

Instruments to calibrate

There should be two sets of each instrument that require calibration; one set is installed in the monitoring systems, and the "spare" set is used for emergency backup.

Recalibrating instruments

Instruments whose calibration date has expired will not be used during the beam operating period. After the beam has been shut down, there is an extended maintenance period of three to four months. Within that maintenance period, send the spare set of instruments to LANL Standards and Calibration for recalibration. Upon its return, install into the Monitoring System, and send the set removed for recalibration. This set then becomes the spare set.

Spare instruments

Maintain an inventory of replacement instruments in the event that an instrument fails its recalibration and has to be replaced.

Flow Measurement Instrumentation, continued

Steps to change out instruments

To change out flow measurement instruments, perform the following steps:

Step	Action
1	Package spare instruments needing calibration by the LANL S&C Lab. Spare instruments are, stored in the TOFI area (TA-53-3M-M105). Listed in Attachment 3 are the instruments needed for a typical run cycle at TA-53.
2	Contact the LANL S&C Lab (667-4864) to arrange pickup of items. If so desired, the items can be delivered to the calibration facility; a Q-clearance is required for entrance to S&C lab. If using a private vehicle, a LANL property transport pass for that equipment is required.
3	When the instruments are returned from the LANL S&C Lab, check the instruments to be sure a calibration sticker has been attached by the S&C Lab. Review the Calibration Certificate available on line for possible "Limited Calibration" conditions or "Rejection". • If a unit is returned from the calibration facility with a "Limited Calibration" sticker, verify that the applicable range of operation is within the calibration limits stated on the sticker or calibration form. • If the instrument has been rejected, send a replacement in for calibration. Print the Calibration Certificate and file it in the Equipment Calibration binder
4	Prior to turning off or removing any of the in-place systems, notify the LANSCE Central Control Room (CCR, 667-5729) of your intent. Certain signals, such as the stack flow, may be monitored by CCR and the loss of signal upon shutdown may result in evacuation alarms, etc. For abnormal circumstance, contact the facility manager to consult with the currently designated facility coordinator.
5	Unplug all power supplies to instruments prior to removal and installation.
6	Contact TA-53 HSR-1 Health Physics (667-7069) to have the desired items checked for removal to an uncontrolled area. Contamination smears of each item and direct radiation measurements will be taken.
7	Remove "old" instruments and install the newly-calibrated ones.

Flow Measurement Instrumentation, continued

Step	Action
8	Check the flow readings on the newly-installed components. Note that unless operating parameters change (target flow rate, orifice size, etc.), the readings on the various gauges should stay constant from year-to-year. If a new gauge is installed that reads significantly different under unchanged operating conditions, check the system for anything which could affect the reading. If necessary, return the new gauge to the S&C Lab for re-calibration and explain why it appears to be reading incorrectly.
9	Leak-test connections by closing the inlet flow control valves on the appropriate sample system pump (if so equipped). The flow on the new gauges should go to zero in this case. This step can be omitted if a complete system leak-check will be performed.
10	Label the instrument panel with the desired flow rate and desired pressure drop reading needed to achieve that flow rate (see Attachment 3). A sample label is shown in Attachment 4.

Detector Calibrations and Performance Tests

Background

Various detectors are used to measure the radioactivity concentrations in the stack effluent, as well as in TA-53 buildings where diffuse (non-point) emissions are of concern. These instruments are calibrated or performance tested in-place by emissions staff.

Note that a calibration implies using a source that can be traced to national standards, whereas a performance test uses a calibrated source to analyze instrument response.

Steps to test performance and calibrate

To test performance and calibrate, use the following steps:

Step	Action
1	Kanne Chamber system testing Kanne chambers are used to determine total levels of radioactive materials in the stack air stream or diffuse source. Using procedure MAQ-604, test performance of each Kanne chamber to be used in the upcoming beam operating cycle.
2	Kanne Chamber background rate determination: When the beam is not operating to the measured area (or before beam operations), calculate the current detected in the Kanne chamber. This current will be the background current and will be subtracted from the measurements during the beam operation cycle. This background level should be verified throughout the beam operating cycle (during outages or when the beam is "off" to monitored areas). For charge-integrating electrometers, divide the charge collected over a long (over 1000 seconds) time interval by the time change. For non-integrating units, simply record an average reading when the beam is off to the monitored area.
3	High-Purity Germanium (HPGe) detector calibration: HPGe detectors are used to identify and quantify the radioactive gases in the stack air stream. Using procedure MAQ-603, calibrate the HPGe detectors on each stack to be monitored in the upcoming beam operations cycle.

Pre-Operational Emissions Projection

Background

Procedure MAQ-610 calls for a pre-operational projection of emissions from each monitored stack at TA-53. This estimate will allow the Rad-NESHAP Project Leader to evaluate programmatic needs of LANSCE operations. Based on this projection, this procedure also requires varying levels of reporting and authorization requirements.

Note that elevated emissions levels typically only occur during extended beam delivery ("production beam") to the 1L Target. Tuning beam operations, pulse beam delivery, and low-current operations (less than 10 microamperes) rarely result in measurable emissions above background levels. Therefore, projections are based on "production beam" only.

Also note that projections of emissions only need be done for emissions of gaseous mixed activation products (GMAP). These emissions dominate the off-site dose. Projections of other types of emissions (e.g., vapor activation products) need not be performed, as the data will trend with GMAP emissions.

It is assumed that, barring unforeseen situations, air emissions are proportional with beam operations, as measured in microampere-hours. This assumption has been demonstrated in recent years.

Determining planned operations

Using the projected operations schedule, determine the operations levels of the ion beam to each target area. This information can be obtained from the LANSCE-6 Beam Delivery web page, or by contacting the LANSCE-6 group office or the LANSCE-DO Director of Operations.

The hours of operation, multiplied by beam current, gives units of microamp-hours (uA-hrs).

For example, if the Line D beam will deliver 100 microamperes (uA) of beam to the 1L target for 30 days (= 720 hours), the beam operations will be:

100 uA * 720 hrs = 72,000 uA-hrs.

Pre-Operational Emissions Projection, continued

Determining emissions rates

For each stack, determine the rate of emissions in curies per microamp-hour. To do this, first determine the operating configuration(s) from previous year(s) which most closely matches the planned operational scenario.

For these configurations, determine the GMAP emissions from a representative time period. These data are available from past GMAP emissions reports.

For the same time period, determine the level of beam operation (microamp-hours). These data can be obtained from historical reports of particulate & vapor activation products (PVAP), which use microamp-hour data to calculate decay. Alternatively, these data can be obtained from the LANSCE-6 Data Scan Re-Play (DSRP) system. Contact LANSCE-6 for more information on this system.

Divide the curies of GMAP emitted by the beam operations to obtain the emission rate, in curies per microamp-hour. If new sources are added, repeat for each applicable source.

Determine estimated emissions

Multiply the estimated hours of operation (microamp-hours) by the estimated emissions rate (curies per microamp-hour) to obtain the release projection, in curies of GMAP.

This estimate may be modified to reflect estimated beam availability, emissions controls devices, or other parameters.

Determine projected composition

Using the operating configurations from previous year(s) which best matches the planned operational scenarios, determine the relative composition of GMAP.

Multiply these percentages by the total curies from the previous step to determine the isotopic breakdown of the projected emissions.

Determine off-site dose

Using historical average values of dose impact (millirem-per-curie factors), determine the off-site dose to the public from facility operations. Alternatively, the MAQ person responsible for dose assessments can perform this step with more accurate data.

Pre-Operational Emissions Projection, continued

Report this estimate

Report the estimate of emissions and resulting off-site dose to the Rad-NESHAP Project Leader, the LANSCE Facility Manager, and the LANSCE-DO Operations Director.

Verification

Throughout the run cycle, verify that the emissions estimate is correct using actual emissions & operations data. If the estimate changes, report the change and new estimate to all above parties. Likewise, report any unanticipated elevated emissions levels according to the Rad-NESHAP Quality Assurance Project Plan and MAQ-610, "RadioactiveAir Emissions Management Plan for LANSCE".

Other Requirements

Background

In addition to the emissions sampling equipment, other functions need to be performed to prepare for the upcoming run cycle. These typically require coordination with other Laboratory groups.

Stack flow measurements

Members of the Rad-NESHAP Engineering team measure the stack flow on a semi-annual basis. Ensure that all ventilation configurations anticipated to be used during the operations cycle are measured.

HEPA filter tests

The HEPA filter banks on the ES-2 and ES-3 stacks require testing by HSR-5 prior to beam operation. Certification by HSR-5 is good for 12 months. Coordinate with HSR-5 to schedule testing of the HEPA filters during the maintenance cycle.

If a filter bank does not meet HSR-5's HEPA performance measures (99.95% removal), consult with LANSCE Operations (LANSCE-DO, -6, and –7) to determine if the system can be replaced or if beam operations can commence with the existing filtration level.

Sample system leak checks

The PVAP sample assemblies are the most likely spots for leaks, and they are leak-tested weekly according to MAQ-601.

Annual sample system leak checks are conducted in conjunction with stack inspections performed by the Rad-NESHAP Engineering team.

Fan preventive maintenance

Preventive maintenance on the stack exhaust fan, boost fans, and other HVAC units is coordinated by the LANSCE-FM maintenance & operations team. If special fan systems are needed by the Emissions team, coordinate with LANSCE-FM to ensure maintenance is performed prior to beam operations.

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be filed in the LANSCE RAEM Records Room (TA-53, Bldg 3R, room R212).

- Pre-operational Checklist for ES-2 (Attachment 2)
- Pre-operational Checklist for ES-3 (Attachment 2)
- Emissions projections reports and associated calculations.
- Certificates of calibration for instruments calibrated by LANL calibration group

HAZARD REVIEW FOR PRE-OPERATIONAL REQUIREMENTS

Work tasks/Steps	**Hazards, Concerns, and Potential accidents; Likelihood/ Severity**	**Controls, Preventive Measures** *(e.g., safety equipment, administrative controls, etc.)*	**Hazard Level** *from IMP 300-00-00 Hazard Grading Matrix*
Task: Perform instrument maintenance and calibrations according to steps in this procedure.	Radiation sources in area. occasional / moderate = low	Take site-specific training. Low-level rad: wear dosimetry as directed by facility-specific training. Practice ALARA techniques when near radiation sources.	Low
Perform instrument maintenance and calibrations in ES-2 stack building.	Radiation exposure – exposure to low-level radiation fields from stack air & sources; accident scenarios at ES-2 stack (1L Target rupture, collect rad material in HEPA filters) remote / critical = minimal	Accident scenarios: keep access training up-to-date; be aware of alarms; wear appropriate supplemental dosimetry as required by limited-access training.	Low
Use hand tools to remove instruments and equipment as needed.	hand tools: minor pinches and scrapes. occasional / moderate = Low	use common sense and work in a calm, unhurried fashion.	Low
Use ladders to access some equipment, as needed.	Ladders, scaffolding: occasional / moderate = Low	Take ladder safety training. Be sure the ladder is well-footed & on a level surface; do not attempt to lean out from ladder or scaffolding or to carry heavy loads on ladders; safely tie off extension ladders	Low

Work tasks/Steps	**Hazards, Concerns, and Potential accidents; Likelihood/ Severity**	**Controls, Preventive Measures** *(e.g., safety equipment, administrative controls, etc.)*	**Hazard Level** *from IMP 300-00-00 Hazard Grading Matrix*
Disconnect and remove instrumentation and equipment as needed.	Electrical transducers - occasional / moderate = Low batteries - occasional / moderate = Low HPGe high-voltage power supply - improbable / moderate = Minimal	electrical - never work on live AC circuits, always isolate power supplies prior to disconnecting. Isolate DC power supplies prior to handling circuitry. Remove high-voltage power supply module from NIM-bin prior to handling HPGe HV connections For batteries, handle with care. Isolate batteries behind shield during normal operations.	Low

Wastes or residual materials resulting from process

None.

Emergency actions to take in event of control failure

For all injuries, provide first aid and see that injured person is taken to Occupational Medicine (only if immediate medical attention is not required) or the hospital. During LANSCE accelerator operation, the Central Control Room (CCR) and HSR-1 offices are staffed 24 hours, 7 days. Contact these offices for assistance as needed.

CCR: 667-5729; Building 4, room 203.
HSR-1 Field Office: 667-7069, Building 3R, room 100.

PRE-OPERATIONAL CHECKLIST

ES-3: Prior to sending beam to the switchyard

This form is from MAQ-615

Required Systems: ES-3 Stack monitoring systems
Switchyard Kanne chamber (diffuse)
Other Kanne chambers (diffuse; as needed)

Pre-Operational Task	Date	Initials
□ ES-3 sampling system gauges within calibration	_____	_____
□ ES-3 50 liter Kanne chamber performance test	_____	_____
□ 50 liter KC background determined _____ pA	_____	_____
□ ES-3 HPGe Calibrated	_____	_____
□ P/VAP sample system leak check_____ cfm	_____	_____
□ Gas sample system leak check _____ cfm	_____	_____
□ Emissions estimate complete & reported	_____	_____
□ HEPA filters checked	_____	_____
□ Stack fan preventative maintenance	_____	_____
□ Boost fans (all) preventive maintenance	_____	_____
□ Switchyard Kanne chamber performance test	_____	_____

Comments:_____

_____

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Systems Ready for Operations: _____ _____
LANSCE Air Emissions Team Member Date

PRE-OPERATIONAL CHECKLIST

ES-2: Prior to sending beam down Line D

This form is from MAQ-615

Required Systems: ES-2 Stack monitoring systems
Any diffuse emissions Kanne chambers

Pre-Operational Task	Date	Initials
□ ES-2 sampling system gauges within calibration	_____	_____
□ ES-2 50 liter Kanne chamber performance test	_____	_____
□ 50 liter KC background determined _____ pA	_____	_____
□ ES-2 HPGe Calibrated	_____	_____
□ P/VAP sample system leak check_____ cfm	_____	_____
□ Gas sample system leak check _____ cfm	_____	_____
□ Emissions estimate complete & reported	_____	_____
□ HEPA filters checked	_____	_____
□ Stack fan preventive maintenance	_____	_____
□ AHU-1, -2, and -3 fans preventive maintenance	_____	_____
□ Building 28, HV-2 system preventive maintenance	_____	_____

Comments:_____

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Systems Ready for Operations: _____ _____
LANSCE Air Emissions Team Member Date

LANSCE STACK MONITORING INSTRUMENTATION - ES-3

This form is from MAQ-615

Monitored Parameter	Instrument	Measures	Desired Value	Desired Readout	Calibrate	Calib Duration	Output
ES-3 Stack Flow	Photohelic 0-0.5" H_2O	Pitot Tube pressure	n/a	>0.12 in. H_2O	pressure	1 year	gauge readout
	Pressure Transducer	Pitot Tube pressure	For information only – no need to calibrate				voltage
ES-3 Gas Flow	Magnehelic 0-2" H_2O	Pressure across orifice	6 cfm	1.0 ± .05 in. H_2O	pressure	1 year	gauge reading
	Pressure Transducer	Pressure across orifice	For information only – no need to calibrate				voltage
	orifice	Flow	n/a	n/a	flow	10 years	pressure
ES-3 PVAP Flow	Magnehelic 0-0.5" H_2O	Pressure Across orifice	2 cfm	0.11 ± .05 in. H_2O	pressure	1 year	gauge reading
	Pressure Transducer	Pressure Across orifice	For information only – no need to calibrate				voltage
	orifice	Flow	n/a	n/a	flow	10 years	pressure
ES-3 TOFI Power Supply	12 V power supply	Power to transducers	n/a	n/a	voltage	1 year	voltage
ES-3 PVAP Power Supply	12 V power supply	Power to transducers	n/a	n/a	voltage	1 year	voltage
ES-3 Gas System Vacuum	Vac. Gauge 0-100" H_2O	Vacuum in system	~10" H_2O	~10" H_2O	pressure	1 year	gauge reading
ES-3 PVAP System Vacuum	Vac. Gauge 0-100" H_2O	Vacuum in system	~12" H_2O	~12" H_2O	pressure	1 year	gauge reading
ES-3 East Filter Bank	Magnehelic 0-1" H_2O	Pressure across filters	~0.9 in H_2O	0.7-4.0" H_2O	none	1 year	none
ES-3 West Filter Bank	Magnehelic 0-1" H_2O	Pressure across filters	~0.75 in H_2O	0.7-4.0" H_2O	none	1 year	none
Inline flow thru 50-L Kanne	Magnehelic 0-4" H_2O	Pressure across orifice	n/a ~0.85	in H_2O	none	n/a	none
	Orifice	Flow	n/a	n/a	flow	10 years	pressure

NOTE: An entry of "none" means system does not require calibration. Items with an entry of "none" typically indicate duplicate gauges, or cases in which the monitored parameter is not compliance-based.

LANSCE STACK MONITORING INSTRUMENTATION - ES-2

This form is from MAQ-615

Monitored Parameter	Instrument	Measures	Desired Value	Desired Readout	Calibrate	Calib Duration	Output
ES-2 Stack Flow	Photohelic 0-0.5" H2O	Pitot Tube pressure	n/a	> .16 in H2O	pressure	1 year	Gauge Readout
	Pressure Transducer	Pitot Tube pressure	For information only – no need to calibrate				Voltage
ES-2 Gas Flow	Magnehelic 0-1" H2O	Pressure across orifice	3 cfm	0.22 ± .05 in. H2O	pressure	1 year	Gauge Reading
	Pressure Transducer	Pressure across orifice	For information only – no need to calibrate				Voltage
	orifice	Flow	n/a	n/a	flow	10 years	Pressure
ES-2 PVAP Flow	Magnehelic 0-0.5" H2O	Pressure across orifice	2 cfm	0.11 ± .05 in. H2O	pressure	1 year	gauge reading
	Pressure Transducer	Pressure across orifice	For information only – no need to calibrate				voltage
	orifice	Flow	n/a	n/a	flow	10 years	pressure
ES-2 Power Supply	12 V power supply	power to transducers	n/a	n/a	voltage	1 year	voltage
ES-2 Prefilter Bank	Magnehelic 0-1" H2O	pressure drop across prefilter	N/A	< 0.5 in H2O	Pressure	1 year	gauge reading
ES-2 HEPA Filter Bank	Magnehelic 0-4" H2O	pressure drop across HEPA	< 2.0" H2O	0.5 – 1.5 in H2O	Pressure	1 year	gauge reading
1L Target Cell Negative Pressure	Photohelic (-0.5" to 0.5")	Pressure in 1L Target Cell	N/A	At least 0.10" negative	Pressure	1 year	Gauge reading
	Note: for operational reasons, gauge is plumbed "backwards" with negative pressure to RIGHT of zero						
	Pressure Transducer	Pressure in 1L Target Cell	For information only – no need to calibrate				Voltage (0-5 VDC)

OTHER EMISSIONS MONITORING INSTRUMENTATION

Monitored Parameter	Instrument	Measures	Desired Value	Desired Readout	Calibrate	Calib Duration	Output
Calibrator/ Picoamphere Source	Keithley Model 263	Supplies known current	n/a	n/a	Current	6 months	Current output
TOFI Particulate Filter assembly leak-check	Vac. Gauge 0-100" H2O	leakage into P/VAP filter assemblies	n/a	n/a	Pressure	1 year	Gauge Reading
Each Diffuse Emissions Monitoring system	Magnehelic (various)	Pressure across orifice	6 cfm	1.0 inches	None	None	Gauge Reading
	orifice	Flow	n/a	n/a	Flow	10 years	Pressure

SAMPLE OF POSTING LABEL FOR INSTRUMENT PANEL

ES-3
PARTICULATE/VAPOR ACTIVATION PRODUCTS (P/VAP) SAMPLE LINE

FOR 2 CFM FLOW

SET TO 0.11 ± 0.05 IN. H_2O

Signed: _____

Effective Date: _____

This form is from procedure MAQ-615

Meteorology and Air Quality Group

PROCEDURE TRAVELER

This form is from MAQ-022

Part 1 (completed by any group employee)

Procedure number: MAQ-615 Revision: ~~2~~ 3 ~~3~~ 4

Procedure title: Pre-Operational Requirements

Action Requested: ☐ New procedure ☒ Major revision of existing procedure ☐ Deletion of existing procedure

Description of and reason for action: ☐ Quick-change revision of existing procedure (parts 3 and 5 N/A)

UPDATE FOR CURRENT OPS

Signature	Name (print)	Date
	DAVE FUEHNE	11/19/03

Part 2 (completed by appropriate manager)

I agree with the action requested: ☒ Yes ☐ No If No, enter reasons below.

If Yes, assigned preparer: KEVIN ANDERSON Affected teams, programs, groups, or individuals required to review this procedure and others who should review it (see procedure page 5):

Required reviewers: ~~BOB KEYS~~, Optional reviewers: ~~BOB~~

Signature	Name (print)	Date
	D FUEHNE	11/19/03

Part 3 (completed by preparer or other qualified safety reviewer)

I have evaluated, according to MAQ-035 and LIR300-00-01, the risks inherent in performing this procedure and have documented them on the Hazard Control Plan form, or referred to a plan that covers this type of work.

Preparer	Name (print)	Date
	KEVIN ANDERSON	2/23/06

Draft prepared and sent for formal review on: 2/22/06. Comments resolved on: 2/23/06. After comments have been resolved with each reviewer, obtain signatures of the reviewers in part 5.

Part 4 (signed by safety officer or group leader)

I agree that the appropriate safety-related activities and appropriate risk level were identified during the hazard evaluation:

Safety officer or group leader	Name (print)	Date
	DIANNE WILBURN	2/23/06

Part 5 (signed by required reviewers: NA for quick-change revisions)

I attest that all my comments and concerns have been satisfactorily discussed, resolved, and/or incorporated into the final version of the procedure.

Signature	Name (print)	Date

Preparer: After all reviewers have signed above section, submit this form with copy of draft and final procedure to records coordinator.